

Reservoir Scandate Cathode for Electric Propulsion, Phase I

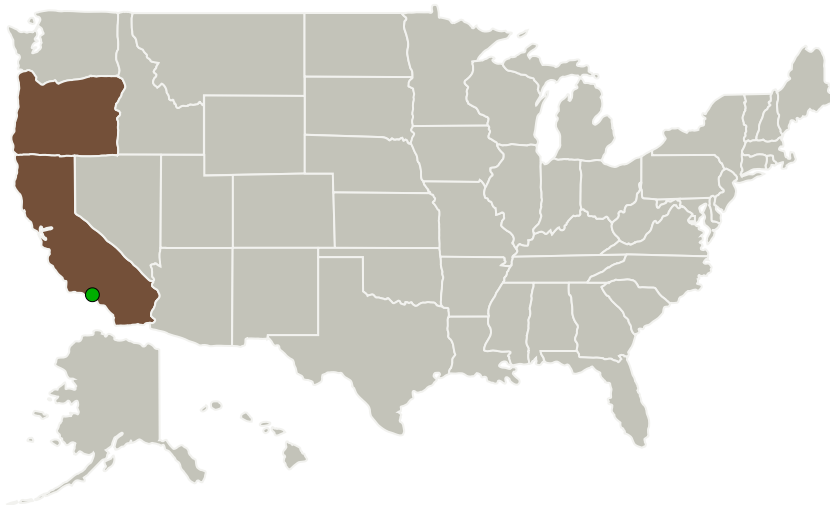
Completed Technology Project (2014 - 2014)



Project Introduction

We propose to combine two revolutionary cathode technologies into a single device for use in electric space propulsion. This will overcome problems that both technologies have when operated alone. The cathode is currently the component which most limits performance and life in ion and Hall Effect thrusters. Improved cathodes are essential for NASA's next generation electric space propulsion initiative. The innovation will benefit both satellite and deep space missions. We have successfully demonstrated both stand-alone reservoir and scandate cathodes in hollow cathode geometries. Reservoir cathodes are known to provide unprecedented life and stability. Scandate cathodes dramatically lower operating temperature. By combining the two technologies, we incorporate extremely long life (greater than 10 years) and extremely low temperature (less than 850 degrees C) into a single device. The result will be a revolutionary enhancement in electric propulsion. Reservoir cathodes employ a chamber behind the emitter which contains a barium emissive material. This greatly increases the amount of barium available to the cathode. Scandate cathodes provide a scandium-containing cathode surface which lowers the work function.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
e-beam, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Beaverton, Oregon
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

e-beam, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Bernard K Vancil

Co-Investigator:

Bernard Vancil

Primary U.S. Work Locations

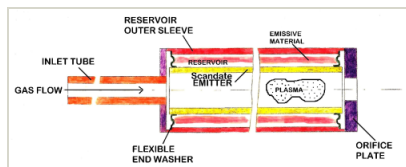
California	Oregon
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Project Transitions

**June 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140530>)

Images



Briefing Chart

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(<https://techport.nasa.gov/image/127920>)

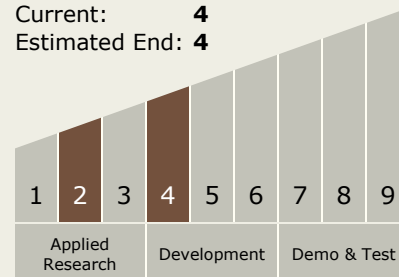
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Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System